

# DESIGN FOR DIGITAL CONTEXT

UNDERSTANDING HOW USER CONTEXT IS EVOLVING

A Fjord Report looking at the background to context-sensitive design and current approaches, as well as providing high-level design recommendations for using context effectively and profitably.

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Fjord, November 2011



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# OVERVIEW

Designing and creating the best digital service experiences demands a clear understanding of user context.

Coupled with the rise of embedded technology, contextually aware design and technology is being utilised more and more to tailor and automate digital experiences.

This Fjord Report looks at the background to context-sensitive design, current approaches, and concludes with analysis and high-level design recommendations for creating digital services that use context effectively and profitably.

## FJORD AND THE SMARCOS PROJECT

Fjord believes one of the most important influences on the future of digital service design will be the growing field of the Internet of Things. By that we mean smarter services, using sensor networks, real-time data, connected objects and novel service touch points requiring next generation interaction models.

Fjord's research work in this area encompasses our involvement in the three-year EU-funded research project SMARCOS, as well as trends and analysis work informing our practice. The SMARCOS project was set up to research 'interusability' in interconnected embedded systems, and Fjord's role in conjunction with our partners is to explore design frameworks and best practices for designing such interconnected systems.

# INTRODUCING THE IDEA OF CONTEXT

Understanding and using context is an inherent aspect of good design. Broadly, context can be defined as *‘the interrelated conditions in which something exists or occurs’*<sup>1</sup>. In everyday communication, context is what frames our conversations and gives meaning to what is being said.

context can be used to increase usability and to enhance experiences

In design, an understanding of these interrelated conditions can be used to increase usability and to enhance experiences. To provide a background to our research into using context in design, we can look at some basic examples from different fields.

## INCREASING USABILITY

A simple example is the ‘You are here’ sticker on public maps: obviously a symbol on a map indicating where it is physically located makes a map instantly a lot more useful.

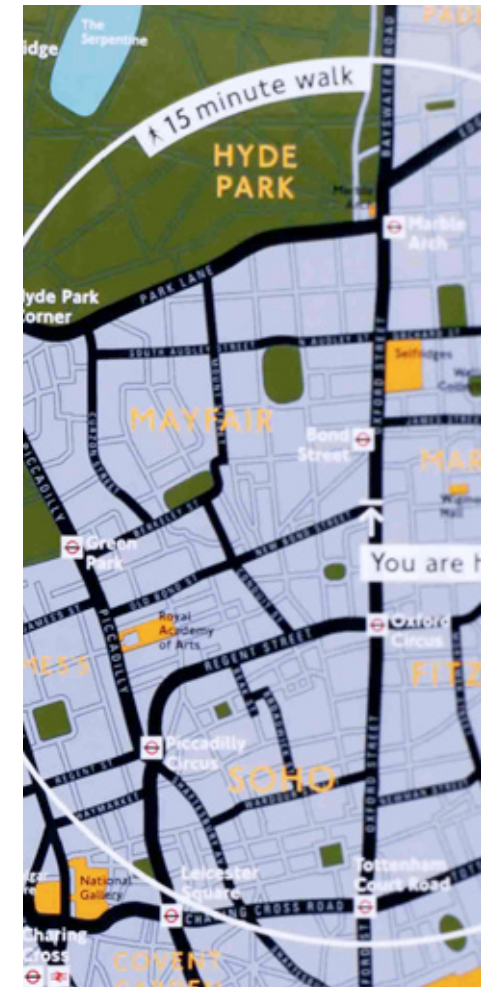
Taking this a step further, the award-winning way finding system ‘Legible London’ is making good use of context. The information and graphics of each ‘map monolith’ are tailored to their specific location and orientation. Unlike traditional maps, north does not face up: instead, each map is rotated according to the signage’s precise alignment in space.

This consideration of context impacts the design process and rollout of the system. Locations of Legible London’s maps are marked and fixed long before they are actually being installed, since the precise location and orientation are needed as reliable input for the

artwork creation. The tolerances are minimal, as Transport for London’s Placement Strategy guide reveals: *‘there is no flexibility in relation to sign orientation. Any rotation of a monolith will require maps to be re-cut and directional information adjusted.’*<sup>2</sup>



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## ENHANCING EXPERIENCES

Sensitivity to context can also increase the impact of an experience. Appropriate examples of this can be found in advertising, with memorable campaigns making clever use of context, and sometimes relying entirely on it.

Understanding context is also at the heart of great architecture. One example could be Frank Lloyd Wright's 'Fallingwater'. Part of what makes this a beautiful piece of architecture is the sensitivity and play with the surrounding environment of the building.

The stone tiles used throughout the building resemble the texture and appearance of water, linking the interior space to the exterior; the waterfall that the building is placed upon. On the outside, the use of long horizontal elements is in stark contrast to the verticality of the nature surrounding the residence, making the building stand out.



TOP <http://www.adweek.com>  
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# THE CONTEXTUAL CHALLENGE FOR DIGITAL SERVICE DESIGN

## 1. NEW CONSUMERS

CONSUMERS INCREASINGLY EXPECT DIGITAL SOLUTIONS TO BE TAILORED TO THEIR INDIVIDUAL NEEDS AND CONTEXTS.

We have moved away from the industrial model of one-to-many, into a new era. Modern technology allows for short-run niche offerings, high degrees of customisation, crowd funded grass-roots products and ongoing dialogue between businesses and their customers, enabling constant changes and improvements to their products.

Our research indicates that consumer expectations are changing and that there is indeed a new kind of consumer that is *'empowered and better informed and switched on'*<sup>3</sup>. Whether this change is driving the move towards one-to-one dialogue or is empowered by it is less important.

## 2. DEVICE CONVERGENCE

MODERN DIGITAL DEVICES ARE BECOMING CONVERGED OBJECTS THAT CAN ACT AS ANYTHING. THE DEVICE ITSELF DOES NOT IMPLY OR CONSTRAIN A CONTEXT.

Whereas a few decades ago mobile phones were still largely targeted devices (phones you could carry around), modern smartphones can also act as quite different targeted devices such as a camera or a sat nav system. They may take the place of hitherto analogue media such as calendars and notepads, electronic entertainment devices like movie players or gaming consoles, or even transactional forms of identification such as a credit or business card.

## 3. HIGH MOBILITY

OUR HIGHLY CONVERGED DEVICES ARE PORTABLE AND USABLE ANYWHERE IN THE WORLD. SIGNIFICANTLY, WE BELIEVE THIS MEANS THAT LOCATION IS NOT A SUFFICIENT INDICATOR OF CONTEXT ANYMORE.

One way of assuming context has typically been the likely location of use. A credit card would typically be used in a shopping situation and a television set would be used in certain rooms indoors. But even a casual examination of users' habits shows that this is not the case anymore, and more sophisticated analysis is required.

## 4. INTERCONNECTEDNESS

DIGITAL DESIGN IS INCREASINGLY ABOUT UNDERSTANDING THE CONFIGURATION OF A SYSTEM AND THE POTENTIAL COMMUNICATION WITHIN IT.

A phone used to be an entirely separate object from, say, a television set. But now there is nothing stopping these devices from being connected, affecting each other dynamically. For example, an incoming call could easily trigger 'pause' or 'record' on the television.

# DISSECTING DIGITAL CONTEXT



To understand the elements that make up digital context and how they can be grouped, Fjord has reviewed articles and papers from both research and industry. Looking at just a few definitions reveals a wide range of approaches.

In research, the focus is on defining context. Some researchers provide specific elements of context like *‘where you are, who you are with, and what resources are nearby’*<sup>4</sup>, others frame it as *‘any information that can be used to characterize the situation of a person, place or object that is considered relevant to*

*the interaction between a user and an application, including the user and applications themselves’*<sup>5</sup>, even more broadly others define context as describing *‘a situation and the environment a device or user is in’*<sup>6</sup>.

On the other hand, within industry sources, definitions tend to be less concerned with defining the actual elements, but rather focus on framing the notion of context. Some describe context as *‘understanding human relationships to people, places and things in the world’*<sup>7</sup>, others define it as *‘the sum total of what your customer has told you and*

*is experiencing at his moment of engagement’*<sup>8</sup>.

Context is also being broken down in different ways. Some researchers suggest a breakdown into *‘context related to human factors’* and *‘context related to the physical environment’*<sup>6</sup>, where the former would break down further into knowledge about the user, the social environment and the task; and the latter into environmental conditions, infrastructure and location. They further suggest that all of these items are to be considered over time to provide historic data.

Other sources suggest a breakdown into *‘hard-sensing’*, which is described as *‘raw physical data about a user’*, and *‘soft-sensing’*, being *‘information about the user, such as preferences and social networks’*<sup>9</sup>.

While Fjord is sympathetic to parts of both views, we believe that from a design perspective the breakdown needs to be different in order to stronger incorporate the less tangible, human aspects.

# FJORD'S WORKING DEFINITION OF CONTEXT

We suggest a model that distinguishes between the technical aspect of context and the human one. A key factor is that technical elements can be detected by a digital system, while human elements involve understanding or interpretation.

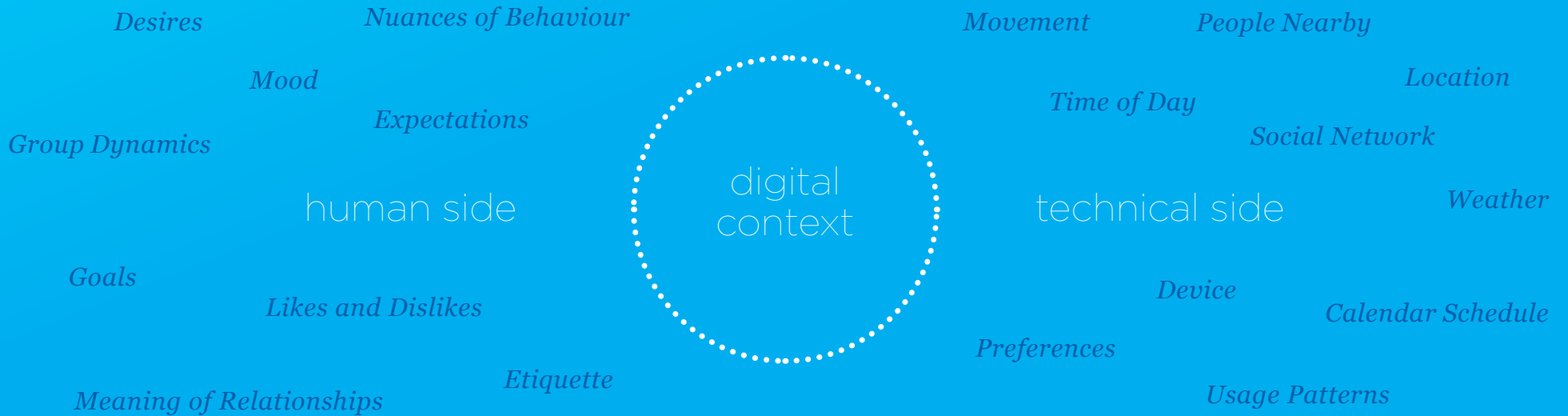
Fjord defines the technical side as *things that can be detected with*

*sensors or derived from (historic) user data and the human side as the bigger picture of human behaviour, which can be studied but may not be detectable.*

For example, a system can detect who is standing next to you, but it needs to understand in order to know what that person means to you.

Our definition includes information about user preferences derived from analysing usage data in the technical side, rather than the human one. This is a key difference to other frameworks. Even though such information is about the user, it is generated technically and therefore far from human understanding.

Note that this is a shifting division, as improvements in technology expand what elements can be reliably detected.





# DOES MORE SENSITIVITY ALWAYS CREATE BETTER EXPERIENCES?

Fjord believes that for future digital services, understanding and using context to tailor and enhance the experience is paramount. To analyse this development we looked at a number of examples from past and present, as well as concepts that are utilising context sensing.

.....  
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technology bias in  
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used today  
.....

Based on our research, Fjord sees a technology bias in the way context is used today. In many cases, context sensing is effectively reduced to things that are detectable, like location.

Fjord sees growing belief in the idea that increasing the amount of context sensing will naturally also enhance the user experience of a service – but there are two pitfalls to this view.

## THE PITFALLS OF RAPIDLY INCREASING CONTEXTUAL SENSITIVITY

### PITFALL NO. 1: THE TRADE-OFFS OF CONTEXT SENSING

The first pitfall is about better understanding the new type of consumer of modern digital services.

When we spoke to London university students about how they use, and feel about, their phones, our aim was to gain insights into the key attitudes and behaviour patterns among one group of mobile phone users.

The key takeaway was that this narrowly defined group of people revealed a wide range of attitudes and behaviours. Some were enthusiastic, frequent users, some were less enthusiastic; and others were distrustful, purposely avoiding owning a smartphone at all.

*“I don’t like the way  
companies track people  
and gather data  
about them.”*



*“I never let my  
phone know my  
current  
location.”*



*“I don’t want my  
phone to be more  
clever or  
do anything  
automatically.”*

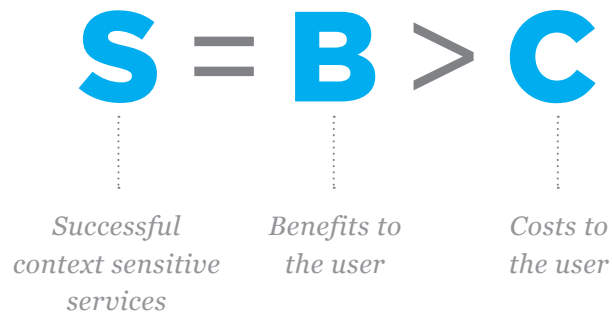


*“I’d want my phone to  
sense what I  
want to do.”*



*“I want my phone to  
understand when  
I don’t want to  
be disturbed.”*





Further analysis of our findings revealed a difference in the articulation between the sceptics and the enthusiasts. The sceptics and non-users could clearly articulate their reservations, listing issues like loss of privacy or the obligations of near-continuous connectivity. On the other hand, the enthusiastic users were

digital solutions offer clear benefits, but at a cost to the user

describing vague concepts of what they would want their phone to do, but most did not have a clear picture of what that might look like and mentioned less or no reservations.

Our conclusion is that while digital solutions offer clear benefits, these benefits come at a cost to the user. This is a trade-off that has to be made. While the benefits outweigh the costs for some users, for others they don't. But generally, we observe that users are increasingly wary of these costs.

For example, sat nav offers a clear benefit over an analogue map, since it can locate itself and thus provide

**BENEFITS:**

- » Utility
- » Connection
- » Pleasure
- » Beauty
- » New Perspective

**COSTS TO THE USER:**

- » Loss of privacy
- » Loss of control
- » Distraction
- » Anxiety

dynamic, automatic navigation aid. The benefits outweigh the costs to the user.

Now consider a networked sat nav that is utilised by a car insurance company to offer lowered rates based on how, where and when the user drives. This service, too, offers a clear benefit, but at a greater cost to the user in terms of privacy.

a successful context sensitive service needs to outweigh the costs with the benefits

This means that a successful context sensitive service needs to outweigh the costs it demands with the benefits it provides.

**PITFALL NO. 2: THE UNCANNY VALLEY OF CONTEXT SENSING**

The second pitfall relates to the technology bias in the industry. Fjord believes that the view of increased context sensing leading to enhanced user experience is a myth.

Our analysis leads us to believe that an increase of context sensing can in fact lead to a big drop in the user experience. This is illustrated by user's backlash against the use of facial recognition technology by social

increased context sensing leading to enhanced user experience is a myth

network Facebook, or the highly location-aware and socially connected photo-sharing app Color that, despite expectations, is receiving limited acceptance and leaves users confused.

Fjord believes the correlation between context sensing and user experience is not linear, but in fact resembles more

that of robotics professor Masahiro Mori's 'Uncanny Valley'.

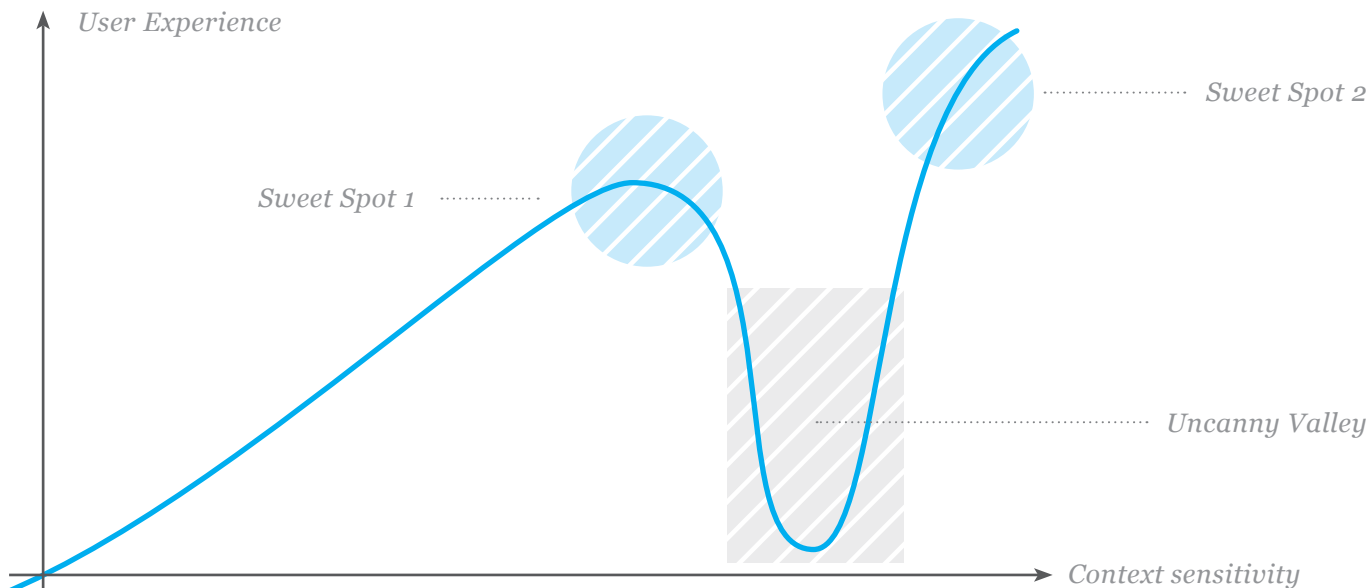
The Japanese researcher's graph from 1970 describes his hypothesis of the correlation between the human likeness of a robot, and the feeling of familiarity it creates in a human onlooker. Rather than a steady, linear increase, the curve describes how robots that are very advanced in their human likeness create a reaction of rejection and revulsion in the human onlookers. They feel 'uncanny'<sup>10</sup>.

**A PRODUCT OR SERVICE FALLING INTO THIS PART OF THE GRAPH HAS CERTAIN CHARACTERISTICS:**

- » It misunderstands user needs.
- » It removes options based on what it (wrongly) thinks a user wants.
- » It acts on user's behalf without approval (explicit or implicit).
- » It shares information inappropriately.
- » It does not understand your culture or social relationships.
- » It offers unsolicited advice.

This can be used to the advantage of creating great digital service experiences. The graph indicates two sweet spots that can be aimed for.

We have identified two emerging approaches to context-aware design that allow for significant advantage, and can be characterised as the current 'sweet spots'.



# FINDING THE 'SWEET SPOTS' IN CONTEXT-AWARE DESIGN

## SWEET SPOT 1

These solutions include simple, focused applications like local search or sat nav systems. They provide clear benefits at low cost to the user, and tend to be transparent about their limitations or how they make decisions. For example, Netflix' recommendation engine might not always get everything right, but by demonstrating how recommendations are determined the effect of an inadequate recommendation is balanced by the increased transparency of the system.

This is currently achievable and focuses on providing select benefits, while minimising costs to the user.

## SWEET SPOT 2:

The characteristics of a close friend could be used to describe Sweet Spot 2: incredibly context sensitive, but also has very good sense of discretion, appropriateness and knows how to honour privacy. It knows when it is fine to bother the user, when it is okay to just act on something and what the right moment might be to tell or request something.

Examples are difficult to find. Intelligently integrated solutions like Blackberry Travel are in this space of appropriate automation. Other examples are the 'humble personal assistant' Siri, lately integrated into Apple's iPhone 4S.

This is currently more of a long-term aim than an immediately achievable goal. It focuses on providing extensive benefits by dynamically adapting to changing human contexts. While costs to the user should be minimised, these may often be overshadowed by the benefits offered.

.....  
increasing context  
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.....

Understanding the characteristics of these sweet spots and accepting that increasing context sensitivity is not a

necessary progression can help create great digital service experiences. Whereas Google's social network Google+ was launched long after Facebook, the emphasis on decreased costs places the service before Facebook into Sweet Spot 1, rather than the 'uncanny valley'. This new approach to sharing and privacy was well received and led to Facebook updating their service, too.<sup>11</sup>

# CONCLUSION: DESIGNING THE SUCCESSFUL CONTEXT SENSITIVE SYSTEM

Designing and building optimal digital services, we have seen, requires an understanding of how context can be used effectively – and what pitfalls can affect our ability to connect with users meaningfully rather than risk alienating them.

To conclude, there are four high level recommendations Fjord has derived from this research and which we recommend taking forward as guidelines for highly powerful yet natural, considerate service design.

## 1 PUT USERS AT THE CENTRE OF THE DESIGN PROCESS.

Extensive and on-going user research during and after the design process can move the understanding of context from the technical bias currently present in the industry to a balanced understanding. This helps define the benefits and costs in order to achieve a design where benefits outweigh costs to the majority of the target user group.

## 2 REDUCE THE COSTS TO THE USER.

Through increasing transparency, user autonomy and security the costs are reduced allowing the benefits to dominate. Reducing costs includes practical measures (e.g. making sure that your system is not easily hacked) and psychological measures (e.g. making sure that users understand why something is happening, so that they don't imagine more intrusion than has actually occurred).

## 3 INCREASE THE BENEFIT OF THE SERVICE.

By appropriately increasing personalisation, adaptation and automation, the benefits offered through context sensing are increased. Increasing benefits can be user-driven (e.g. through preferences or responding to usage patterns), context-driven (e.g. through dynamic modification of the service) or utility-driven (e.g. by simplifying task-flows or even acting on user's behalf). All of these efforts are potentially increasing costs to the user; therefore they have to be considered with great care.

## 4 AIM FOR THE RIGHT SWEET SPOT.

Incremental additions in context sensitivity risk making the user experience much worse, pushing a service into the 'uncanny valley' rather than making it incrementally better. Where the 'close friend' characteristics of Sweet Spot 2 are not reliably achievable, a more limited amount of context sensing and an emphasis on decreased costs will probably lead to a better user experience.

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## DESIGNING FOR DIGITAL CONTEXT

FJORD  
NOVEMBER 2011

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## ABOUT FJORD

Fjord is a leading user-centric design consultancy, currently ranked by Deloitte and the Sunday Times as the fastest growing in EMEA. Fjord works with visionary clients to design world-class digital services and is driven by one guiding principle: elegant simplicity.

Fjord has worked on flagship projects providing strategic direction and design for major brands including: Nokia, Ericsson, Telefonica, BBC, Thomson Reuters, BBVA, Foursquare, MySpace and Yahoo!

Fjord was founded in 2001 and is led by Olof Schybergson, CEO. Fjord has offices in Berlin, Helsinki, London, Madrid, New York, Stockholm and San Francisco.

## ABOUT SMARCOS

Smarcos is a three-year, € 14m Artemis funded research project involving 17 partners across seven countries in Europe. Smarcos began in 2010 with a brief to investigate 'interusability' - user interface level interoperability of embedded systems. In other words, how do you design user centred experiences that work for the Internet of Things.

Over the course of the project, Smarcos will deliver prototypes, scenarios, definitions and standards. The Smarcos deliverables Fjord are involved with include design guidelines and best practice for dynamic user interfaces as well as scenario generation, service and UI design for technology trials to be held in 2012.